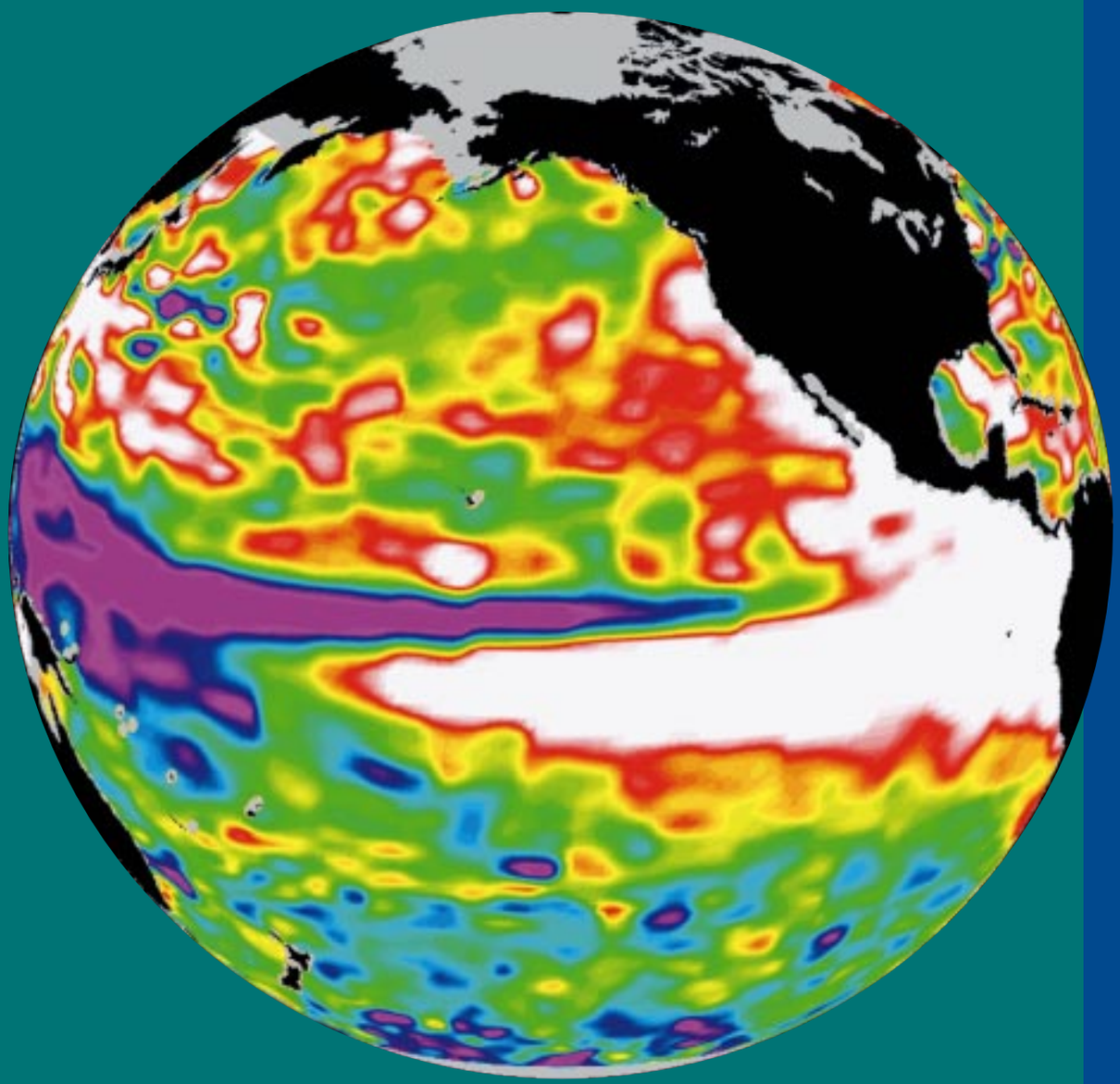
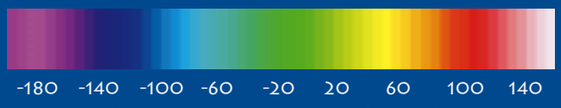
EARTH SCIENCE DATA



EL NIÑO: A CLIMATE EVENT

Information, Data, and Services From the EOSDIS DAACs and Other Cooperating Data Centers

· LAND · OCEANS · ATMOSPHERE · HUMAN INTERACTIONS ·



Color bar for TOPEX/Poseidon maps of sea-surface height relative to normal (in millimeters)

The cover shows sea-surface height images made from the Ocean Topography Experiment (TOPEX)/Poseidon radar altimeter data. The TOPEX/Poseidon satellite uses an altimeter to bounce radar signals off the ocean's surface to get precise measurements of the distance between the surface and the satellite. Every 10 days, scientists produce a complete map of global ocean topography, the barely perceptible hills and valleys found on the sea surface. With detailed knowledge of ocean topography, scientists can monitor ocean events such as El Niño and La Niña.

An El Niño condition begins when westward-blowing trade winds weaken and even reverse direction. This event allows the large mass of warm water that is normally located near Australia to move eastward along the equator to the coast of South America. The bulge of unusually warm water affects evaporation and precipitation and alters the typical atmospheric jetstream patterns worldwide. The bulge of warm water, in places 30 centimeters (1 foot) above average, can be tracked using an altimeter.

The 1997–98 El Niño was the strongest ever recorded. This phenomenon caused record rainfall amounts in California, heavy flooding in Peru, drought and wildfires in Indonesia, tornadoes in the southeastern United States, and loss of life and property damage worldwide.

Images on the cover show the growth of the warm-water pool to its peak in November 1997. The warm pool extended from the international date line to the coast of South America and for hundreds of miles north and south along the Americas. In Spring 1998, the El Niño weakened as the volume of the warm-water pool decreased. By June 1998, only a small remnant of the warm pool remained in a small band north of the equator.

Information was provided by the TOPEX/Poseidon office at the Jet Propulsion Laboratory (JPL). For additional information, see the TOPEX/Poseidon Web page at http://topex-www.jpl.nasa.gov.

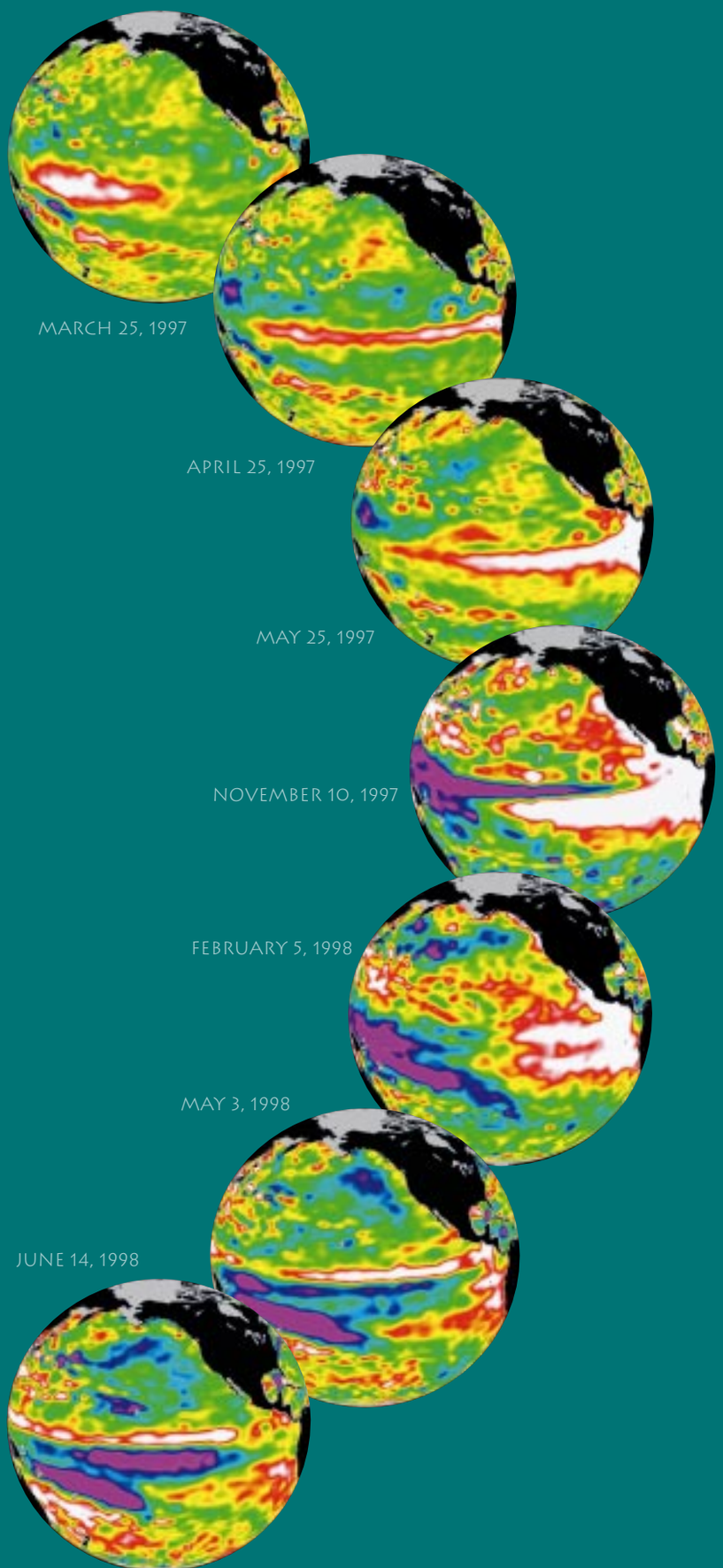
A detailed description of the images on the cover is provided on the inside pocket. These images and the explanatory text also are available from the TOPEX/Poseidon Web page.

For information on the data and services of the Earth Observing System Data and Information System (EOSDIS) Distributed Active Archive Centers (DAACs):
http://eos.nasa.gov/daac

Data search-and-order service:
http://eos.nasa.gov/imswelcome

Directory of Earth science data sets:
http://gcmd.nasa.gov

The rise and fall of the 1997–98 El Niño as shown by images of sea-surface height from TOPEX/Poseidon altimeter data



NASA

EOS

MARCH 25, 1997 In March, westerly wind bursts (i.e., eastward-blowing winds) north of Australia triggered an oceanic Kelvin wave that traveled eastward toward the Americas. This event allowed warm water to move away from its usual location in the western Pacific Ocean. Red and white colors show sea level that is above the average height. This area corresponds to water from the warm pool that originated in the seas northeast of Australia.

APRIL 25, 1997 About 1 month after being triggered by eastward-blowing winds near Australia, an oceanic Kelvin wave reached South America. During this period, the oceanic pulse traveled over one-third the circumference of the Earth! The Kelvin wave is shown as the red-and-white band along the equator, indicating above-average sea level.

MAY 25, 1997 In May, warm water started piling up against the South American continent and higher levels began to spread along the coasts of both North and South America. The white, V-shaped wedge shows the area where sea-level height rose 12 to 30 centimeters (5 to 12 inches) above normal and temperature 2 to 3 degrees Celsius (3 to 5 degrees Fahrenheit) above normal.

NOVEMBER 10, 1997 November was the peak of the 1997–98 El Niño with a large extent of above-average sea level, especially off the western coast of North America. The sea level peaked at about 35 centimeters (14 inches) above average in the eastern Pacific, near the Galapagos Islands.

FEBRUARY 5, 1998 By February, although the warm pool remained large, it had thinned along the equator and near the coast of South America. The warm water was not as deep as it had been a few months earlier, and less heat was available to the atmosphere.

MAY 3, 1998 In May, sea-surface height of the central equatorial Pacific was still at near-normal levels. Remnants of the warm-water pool lingered mainly north of the equator, and the El Niño condition continued to abate.

JUNE 14, 1998 In June, remnants of the warm pool show as a thin, white area north of the equator. However, the most noticeable feature in the tropical Pacific Ocean is the large extent of the below-normal sea level and temperature that marks the end of the 1997–98 El Niño. This feature, shown as purple, may indicate the start of a La Niña event, which can be thought of as the opposite of an El Niño.

NORW9961/01-99